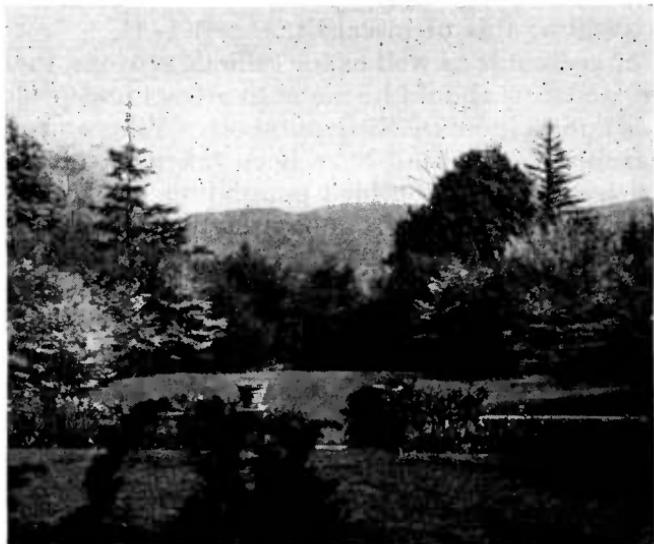


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U. S. DEPARTMENT OF  
AGRICULTURE  
FARMERS' BULLETIN No. 1644

LOCAL  
BIRD REFUGES



**B**IRDS appeal strongly to the interests and affections of mankind. Not only do they charm by their graceful forms, harmonious colors, sprightly actions, and usually pleasing notes, but they have an even more important claim upon our esteem because of their great economic value.

Birds feed upon practically all insect pests. They are voracious, able to move freely from place to place, and exert a steady influence in keeping down the swelling tide of insect life.

For economic as well as for esthetic reasons, therefore, an effort should be made to attract and protect birds and to increase their numbers. Where proper measures of this kind have been taken an increase of several fold in the bird population has resulted, with decreased losses from depredations of injurious insects.

This bulletin, one of a series describing the best methods of attracting birds, deals with the establishment of local bird refuges, and is adapted for use throughout the United States. It supersedes Farmers' Bulletin 1239, Community Bird Refuges.

Washington, D. C.

Issued March, 1931

# LOCAL BIRD REFUGES

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## INTRODUCTION

BIRD CONSERVATION in the United States is a well-established policy that has been written into one of the best codes of State and Federal protective laws in the world. Originally, the basis of much of this legislation was the demonstrated practical value of birds in controlling injurious insects, but later widespread appreciation of birds' esthetic worth has developed into a country-wide bird-protective sentiment. Notwithstanding this fine public spirit, it is important that the human friends of the birds give practical attention to special local needs for their welfare.

One of the most effective ways of providing for birds is to develop various types of local refuges. In creating a useful bird refuge, the first step is to insure adequate protection against all bird enemies; the second, to see that plenty of nesting sites suited to the needs of various birds are available; and the third, to improve food and water supplies, if necessary.<sup>1</sup> Instructions for accomplishing these results are contained in five earlier Farmers' Bulletins. Farmers' Bulletin 1456, Homes for Birds, adapted to the whole country, relates to bird houses, and the following four Farmers' Bulletins: 621, How to Attract Birds in Northeastern United States; 760, How to Attract Birds in Northwestern United States; 844, How to At-

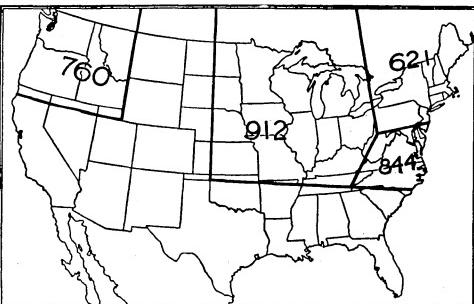


FIGURE 1.—Areas treated by the several Farmers' Bulletins on methods of attracting birds

<sup>1</sup> Addresses of dealers in devices for attracting birds and a list of publications on the subject available from other sources may be obtained on application to the Bureau of Biological Survey, U. S. Department of Agriculture, Washington, D. C.

tract Birds in the Middle Atlantic States, and 912, How to Attract Birds in the East Central States, describe methods of attracting birds in various parts of the country.

#### BIRD REFUGES ON FARMS

Farmers, more than any other element of the population, will be interested in the establishment and maintenance of effective bird refuges, for the welfare of crops and the commercial success of the farm are intimately related to the numbers and kinds of birds present and to their economic tendencies. In the case of certain species that are more or less injurious, control measures are sometimes necessary, but the great majority of birds vary from slightly to almost exclusively beneficial in their relations to the farm. The useful species merit the fullest protection and should be encouraged in every possible way.

The value of birds lies chiefly in their destruction of injurious insects. Leading an active life, they require much food and are the most ravenous enemies of pests of this kind. The various groups of birds differ so much in habits that they feed upon practically all groups of insects; hardly an agricultural pest escapes their attacks. The alfalfa weevil has 50 different bird enemies; the army worm, 43; billbugs, 110; the cotton-boll weevil, 66; the brown-tail moth, 31; chestnut weevils, 85; the chinch bug, 29; clover-root borers, 94; the clover weevil, 48; the codling moth, 36; the cotton worm, 41; cutworms, 98; the forest tent caterpillar, 32; the gypsy moth, 46; horseflies, 49; leaf hoppers, 175; the orchard tent caterpillar, 43; the potato beetle, 34; the rice weevil, 22; the 12-spotted cucumber beetle, 42; white grubs, 95; and wireworms, 205.

In feeding on insect pests not only do birds take a great variety but they frequently destroy very large numbers. Often more than a hundred individuals are devoured at a meal, and in the case of small insects sometimes several thousand. With such appetites it is not surprising that occasionally birds entirely destroy certain insects locally. A number of cases are known in which trees, garden crops, and even farm fields have been entirely freed of insect pests by birds. On a 200-acre farm in North Carolina it was found that birds were destroying a million green bugs, or wheat aphids, daily.

On the average there are in the United States only about two birds to the acre, but where they are protected and encouraged it has been demonstrated that a great increase over the normal bird population can be brought about. No fewer than 59 pairs to the acre is the figure reached in the most successful of these attempts reported. Bird counts as noted in many instances give an average of a pair of birds to the acre in the breeding season. Birds that pass through the United States to breed in the northerly parts of North America equal, if they do not surpass, in number the population of breeding birds.

The arid section of the United States has fewer birds than the humid, and if an estimate of one pair of birds to the acre is made for the humid regions, it will be safe to use half that number, or one bird to the acre, for the arid region. The totals reached from these calculations are more than 1,161,000,000 breeding birds for the arid, and more than 1,483,000,000 for the humid States.

For the purpose of computing their value in destroying pests, the breeding birds may be reckoned as preying upon them during six months of the year. The migrants that pass entirely beyond the borders of the United States may be estimated to spend a month on each of the northward and southward passages. Their repressive effect on insect and other pests is exerted therefore over a period one-third as long as that of the breeding birds.

By estimating the value of each breeding bird in the destruction of insects at only 10 cents a season (a purely nominal figure) and the value of the strictly migratory birds at one-third of that figure (3.3 cents), corresponding to the relative time they spend within the United States, and by using the numbers of birds to the acre noted before, a valuation of the services of birds is reached of nearly \$200,000,000 for the humid region and more than \$150,000,000 for the arid region. The total, \$350,000,000, is about a fourth of a recent estimate (\$1,590,040,500) of the total damage wrought by insects.

A particular farm may not have so large a bird population as it should, and therefore may not be deriving the benefit that is its due. The most effective means of increasing the number of birds is protection, and protection in its best sense is afforded by the establishment of bird refuges.

Bird refuges on farms have been most successful when established and maintained on a cooperative plan between the landowner or landowners and a State game commission, an Audubon society, a bird club, or a school. The owner agrees to the use of the land and acts as warden, and the other party to the contract furnishes and places posters, bird houses, and feeding stations, or even stocks the refuge, as in the case of reservations for game birds. The beneficial effect that the establishment of a bird refuge has upon trespass problems is a great advantage to the farmer. A State law authorizing game wardens to proceed against trespassers on bird reservations greatly increases the effectiveness of private and cooperative bird refuges.

The cooperative bird preserve has been tried in many States as a means of establishing colonies of game birds, such as pheasants, and the plan has invariably proved popular and successful. As a method of protecting insectivorous birds it has been put into practice by schools, bird clubs, and Audubon societies in New Hampshire, Connecticut, Illinois, and Minnesota, at least, and has been found satisfactory and effective.

#### WOOD LOTS

As applied to wood lots, bird protection and attraction methods must be simplified. It is not feasible, as a rule, to adopt special protective measures, but vagrant cats and occasionally a sharp-shinned hawk, Cooper's hawk, or red squirrel can be eliminated from the farm.

If a wood lot contains no small streams, it will probably be impracticable in most cases to furnish water. If there is a water supply not far away, some birds no doubt will nest in the wood lot, but if there is none within easy flying range, the other woodland attractions will go for naught.

The provision of nest boxes is an obligation nowadays upon all who would help birds. No longer is there the profusion of decaying or dead trees containing cavities that once formed the natural homes of a whole series of valuable birds. Unless nest boxes are provided for these species, all but the most expert drillers among the woodpeckers, and the few birds that fall heir to their abandoned nest cavities, will become greatly reduced in numbers. These hole-inhabiting birds, as the woodpeckers, crested flycatcher, tree swallow, house wren, nuthatches, titmice, chickadee, and bluebird, are among the most valuable bird friends of the forest, and action should be taken in every wood lot to furnish them places to rear their young.



FIGURE 2.—Birds attracted by food in winter

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Besides protection, water, and nest boxes, the birds' food supply should receive some attention. It is easy, for instance, in clearing woodlands to spare, here and there, a Juneberry, raspberry, blackberry, elderberry, or mulberry bush. The presence of their favorite wild fruits will induce more birds to nest in the wood lot and will help them with their food problems. If wild berries are not already present, it will be well to plant some of the most favored kinds about the woodland margins. A list of these fruits will be found in Table 1, p. 8, and the seasons when they are in bearing in the different sections of the country are given in the Farmers' Bulletins mentioned on page 1.

Winter is the time of the birds' greatest need for artificial provision of food. (Fig. 2.) The foods commonly used for winter feeding include suet or other fat, pork rinds, bones with shreds of meat, various seeds, and the like. The methods of making these supplies available to birds are as varied as the dietary itself. They are described in the Farmers' Bulletins referred to.

Feeding places for game birds and sparrows may be provided by erecting low hutches or making wigwamlike shocks of corn or

grain sheaves under which food may be scattered. The opening should be to the south. These shelters should be inspected about once a week to see that they are not covered or blocked with snow, and to renew the food supply. If predatory animals are attracted to such spots, discontinue feeding there, scatter the food in a different place each time, and take steps to control the predators.

In thinning trees it would be well, also, to allow for entertaining some of the seed-eating birds. Alders and birches bear in their numerous cones a supply of seeds eagerly sought by redpolls, siskins, and goldfinches in winter. The winged fruits of ashes and boxelders are opened and the seeds eaten by pine and evening grosbeaks. Larches, pines, and other conifers attract crossbills, as well as some of the species just mentioned.

A fundamental of forest protection everywhere is prevention of fires, which not only directly kill trees, especially those of the younger generation, but consume the humus so necessary to healthy forest growth and to water conservation. Fire also damages trees not killed, by rendering them more subject to attacks of insects and to decay. Prevention of fires is for the good of birds as well as of trees. The measures that are recommended to minimize damage by fire, such as cleaning out old roads and trails as fire barriers and breaking up large woodlands into blocks by open fire lanes, also encourage the presence of birds. Birds are much more numerous around the margins and in openings of woodlands than in extensive dense forests, and in mixed plantings more than in pure stands.

Another good wood-lot policy that benefits the birds is excluding grazing animals, for the undergrowth is of importance in furnishing nesting sites and food for the birds and, together with the leaf mold, in maintaining a sufficient degree of humidity. Although it is contrary to general practice, foresters advise against grazing in wood lots. A closely pastured wood lot is recognizable at a glance; the ground is bare, puddled, and hard, and the undergrowth and limbs of the trees as high as the cattle can conveniently reach have been destroyed. The old trees are injured (stag-headed) by the compacting of the soil around their roots and by destruction of the humus layer, and reproduction is entirely prevented. Grazing and the continuous forest reproduction that is so necessary for profitable wood lots are incompatible.

Gradual rather than widespread cutting of wood lots is recommended, as it interferes less with general conditions favorable to trees and always leaves some of the older seed-bearing trees to provide for reproduction. This policy also is favorable to birds, for it permits most of them to resort to the same area year after year instead of seeking new homes, and in general involves the least change in the essential conditions of the environment. Indeed, practically everything that is good for maintaining the wood lot is good for birds.

#### ROADSIDES

Making bird refuges on farms, although of most direct interest to the farmer, is by no means the only activity along this line helpful to agriculture. Attracting birds to roadsides and right of ways, in particular, is of almost equal importance and furnishes a leading reason for urging a treatment of these public and semipublic travel

ways that will not only increase their bird population but make them more sightly. Both features will increase the value of the adjacent farms.

In many parts of the United States roadsides are shorn of their vegetation at least once a year, either as a result of local sentiment or of legal requirement. Consequently, many country roads are very uninviting in summer. Hot and gray with dust, the highway stretches away before the traveler, often without a single tree to break the monotony of the view or afford relief from the rays of the sun. This baldness is brought about chiefly by two causes: (1) Fear that the roadside will unduly increase weeds and insect and rodent pests; and (2) lack of public spirit.

Fortunately, there are also in this country examples of well-kept parkways and boulevards bordering cultivated lands. Their ample parking is grown to grass and embellished with herbaceous flowering plants, shrubs, and trees. Yet the farm lands they border are neither overwhelmed by weeds nor devastated by insects and rodents.

The possibility of roadsides propagating vast numbers of noxious weeds may be viewed in more than one light. For instance, the mowing of waysides for long series of years has not done away with the need of cultivating adjacent crops; indeed it can not, for cultivation is necessary for other reasons than the destruction of weeds, as the loosening and aeration of the soil, and water conservation. Furthermore, the degree of cultivation customarily given crops is sufficient to control all the weeds the land will grow, and this number is generally present, despite the razing of roadside growths. On the other hand, the lack of verdure and shade and the general dreariness of roadsides make the adoption of a different treatment of these most extensive public parkings very desirable. Placing vines upon fences and planting numerous shrubs and shade trees along the way will not only render the roads more attractive but will tend to keep down the dust.<sup>2</sup>

In the case of paved highways it has been demonstrated also that roadside trees prolong the life of the pavement by protecting it from extremes of temperature. This is particularly true of the heat of summer, which, depending on the nature of the pavement, may either expand it, causing the surface to be thrown into waves, or dry it out, forming cracks.

Another practical end of planting may be served by using nut-bearing trees, which could be made a definite source of revenue to the community. In choosing plants for roadsides, as elsewhere, be sure to omit the common barberry, which serves as an alternate host for wheat rust, and buckthorn, carrier of the crown rust of oats; gooseberries and currants, which have a similar relation to the white-pine blister rust; and the wild black cherry, which is a favorable nursery for tent caterpillars.

There can be no doubt that suppression of roadside vegetation is a potent factor in restricting the numbers of birds, and the ever-increasing tendency to allow fence rows the minimum of space has the same effect. Farmers may gain a planting row about every field by the destruction of vegetation along fences, but they lose the services of the birds, their best allies in fighting insects.

<sup>2</sup> In this connection the following publications will be helpful: Farmers' Bulletin 1481, Planting the Roadside, and Farmers' Bulletin 1482, Trees for Roadside Planting.

Shrubby fence rows are among the best harbors and nesting places of small birds, and it is certain that encouraging an abundance of birds to live on farms by such plantings is a profitable policy. More should be done to beautify roadsides and fence rows, not only as a measure to contribute to the comfort and pleasure of man, but also substantially to increase a great economic asset—the bird population of the country.

The windbreaks so useful on farms in prairie regions are in effect but shrubby fence rows magnified. Their utility in protecting crops from winds always is supplemented by that of furnishing nesting sites for birds, and a food-supplying function also may easily be added, for Russian-olive, buffaloberry, and hackberry, all good bird foods, are highly recommended as windbreaks.

#### RIGHT OF WAYS

A number of railroad companies have already made considerable effort to beautify their right of ways and station grounds. In some places the roads are paralleled for many miles by hedges, and the land on either side of the tracks is covered by beautiful turf. Hedges, shrubbery, and flower beds are common about the stations. If this planting could be directed in part, at least, toward attracting birds, it would be very effective and great good would be done. If the clumps of shrubs were formed of kinds furnishing the birds food (see Table 1) and more of them were placed along the right of ways, the hedges allowed to bear fruit, and the fence poles or possibly even some of the telegraph poles were furnished with bird houses, thousands of birds could live where very few do now.

The suggestions made are by no means without practical value to the right of way itself. For instance, supplying bird boxes is the best method of preventing damage to poles by woodpeckers, which come anyway under present conditions and make their own homes. Hedges or fences densely covered with vines would decrease, if they would not entirely obviate, expenditures for the movable snow fences now extensively used.

The project of increasing the number of birds along right of ways should interest the agricultural-development bureaus of railroads. The small birds that are most easily encouraged when shrubbery, nest boxes, and water supply are provided are chiefly beneficial, and increasing their numbers would result in great destruction of insects on adjacent farms, a very practical bit of agricultural improvement.

#### COMMUNITY PARKINGS

The attractiveness of community parkings, including those of cities and villages as well as of rural areas, may well be enhanced by the presence of an abundance of birds. This can be effected without in any way detracting from the utility of these reservations for their leading purposes. Making community parkings safe for birds is the first step; they must actually be havens of refuge. In this connection may be cited the admirable law of the State of Oregon that provides that all incorporated towns and cities and all public parks and school grounds in the State shall be, without additional local or general legislation, bird and game sanctuaries.

TABLE 1.—*Preference of birds among genera of fleshy fruits<sup>1</sup>*

Common name	Scientific name	Number of species of birds known to eat the fruit <sup>2</sup>	Kinds of birds among those desirable to attract that are most fond of the fruit <sup>3</sup>
Juniper; redcedar	<i>Juniperus</i>	39	Yellow-shafted flicker, European starling, evening grosbeak, pine grosbeak, purple finch, cedar waxwing, myrtle warbler, mocking bird, robin, eastern bluebird.
Greenbrier	<i>Smilax</i>	39	Cardinal, mocking bird, brown thrasher, catbird, hermit thrush, robin.
Bayberry	<i>Myrica</i>	73	Bobwhite, downy woodpecker, yellow-shafted flicker, eastern phoebe, European starling, meadow lark, chewink, tree swallow, white-eyed vireo, myrtle warbler, brown thrasher, catbird, Carolina wren, black-capped chickadee, hermit thrush, eastern bluebird.
Hackberry	<i>Celtis</i>	40	Yellow-bellied sapsucker, yellow-shafted flicker, starling, cardinal, cedar waxwing, mocking bird, brown thrasher, robin, eastern bluebird.
Mulberry	<i>Morus</i>	52	Yellow-billed cuckoo, red-headed woodpecker, red-bellied woodpecker, downy woodpecker, kingbird, starling, Baltimore oriole, orchard oriole, cardinal, purple finch, scarlet tanager, cedar waxwing, red-eyed vireo, yellow warbler, mocking bird, catbird, wood thrush, robin.
Pokeberry	<i>Phytolacca</i>	49	Mourning dove, yellow-shafted flicker, kingbird, starling, cardinal, mocking bird, catbird, hermit thrush, gray-cheeked thrush, olive-backed thrush, robin, eastern bluebird.
Spicebush	<i>Benzoin</i>	17	Kingbird, red-eyed vireo, wood thrush, veery.
Sassafras	<i>Sassafras</i>	18	Bobwhite, kingbird, red-eyed vireo, catbird, veery, robin.
Strawberry	<i>Fragaria</i>	46	Chewink, catbird, brown thrasher, wood thrush, robin.
Raspberry; black-berry.	<i>Rubus</i>	118	Ruffed grouse, bobwhite, red-headed woodpecker, yellow-shafted flicker, kingbird, European starling, Baltimore oriole, orchard oriole, pine grosbeak, song sparrow, fox sparrow, white-throated sparrow, chewink, California towhee, spurred towhee, cardinal, rose-breasted grosbeak, black-headed grosbeak, cedar waxwing, red-eyed vireo, mocking bird, catbird, brown thrasher, tufted titmouse, wren tit, olive-backed thrush, wood thrush, robin, eastern bluebird.
Rose	<i>Rosa</i>	25	Ruffed grouse, sharp-tailed grouse, prairie chicken, bobwhite.
Mountain-ash	<i>Sorbus</i>	14	Red-headed woodpecker, Baltimore oriole, evening grosbeak, pine grosbeak, cedar waxwing, Bohemian waxwing, catbird, brown thrasher, robin.
Chokeberry	<i>Aronia</i>	13	Meadow lark, brown thrasher.
Hawthorn, or red haw	<i>Crataegus</i>	33	Ruffed grouse, pine grosbeak, purple finch, robin.
Dwarf apples	<i>Malus</i>	(4)	Ruffed grouse, ringneck pheasant, red crossbill, pine grosbeak, purple finch, cedar waxwing, mocking bird, robin.
Shadblow, or June-berry.	<i>Amelanchier</i>	40	Yellow-shafted flicker, Baltimore oriole, cedar waxwing, catbird, hermit thrush, veery, robin.
Wild cherry	<i>Prunus</i>	74	Ruffed grouse, bobwhite, mourning dove, red-headed woodpecker, yellow-shafted flicker, kingbird, European starling, Bullock's oriole, Baltimore oriole, orchard oriole, evening grosbeak, purple finch, rose-breasted grosbeak, black-headed grosbeak, Louisiana tanager, red-eyed vireo, cedar waxwing, mocking bird, catbird, brown thrasher, olive-backed thrush, wood thrush, robin, eastern bluebird.
Sumac <sup>5</sup>	<i>Rhus</i> <sup>5</sup>	93	Ruffed grouse, bobwhite, valley quail, downy woodpecker, red-bellied woodpecker, red-shafted flicker, yellow-shafted flicker, phoebe, European starling, goldfinch, golden-crowned sparrow, chewink, white-eyed vireo, Audubon's warbler, mocking bird, catbird, California thrasher, brown thrasher, Carolina wren, black-capped chickadee, Carolina chickadee, wren tit, hermit thrush, robin, eastern bluebird.

<sup>1</sup> Barberries (*Berberis*), buckthorn (*Rhamnus*), and gooseberries and currants (*Ribes*) are omitted because they serve as alternate hosts of rusts attacking wheat, oats, and white pine, respectively.

<sup>2</sup> When 10 or more.

<sup>3</sup> Included on the basis of field observation or because fruit was found in 10 or more stomachs.

<sup>4</sup> Thirty-eight kinds of birds are known to feed on apples of various sorts, but it is not known just how many seek the small-fruited flowering apples, which are the best to plant for birds.

<sup>5</sup> Only nonpoisonous species of sumac are considered.

TABLE 1.—Preference of birds among genera of fleshy fruits—Continued

Common name	Scientific name	Number of species of birds known to eat the fruit	Kinds of birds among those desirable to attract that are most fond of the fruit
Peppertree.....	Schinus.....	11	Cedar waxwing, phainopepla, hermit thrush, varied thrush, robin.
Holly.....	Ilex.....	45	Ruffed grouse, bobwhite, valley quail, yellow-bellied sapsucker, yellow-shafted flicker, cedar waxwing, mocking bird, catbird, brown thrasher, hermit thrush, robin, eastern bluebird.
Supplejack.....	Berchemia.....	13	Mocking bird, robin.
Wild grape.....	Vitis.....	77	Ruffed grouse, bobwhite, pileated woodpecker, red-bellied woodpecker, red-shafted flicker, yellow-shafted flicker, kingbird, European starling, cardinal, cedar waxwing, mocking bird, catbird, brown thrasher, wood thrush, veery, robin, western bluebird, eastern bluebird.
Virginia creeper.....	Parthenocissus.....	39	Red-headed woodpecker, red-bellied woodpecker, yellow-bellied sapsucker, yellow-shafted flicker, European starling, evening grosbeak, purple finch, scarlet tanager, red-eyed vireo, mocking bird, brown thrasher, tufted titmouse, hermit thrush, olive-backed thrush, gray-cheeked thrush, robin, eastern bluebird.
Buffaloberry.....	Lepargyreia.....	16	Sharp-tailed grouse, pine grosbeak.
Silverberry, Russian-olive, etc.....	Elaeagnus.....	(6)	Sharp-tailed grouse, prairie chicken, cedar waxwing, catbird, robin.
Wild-sarsaparilla.....	Aralia.....	14	Bobwhite, robin.
Dogwood.....	Cornus.....	86	Ruffed grouse, bobwhite, downy woodpecker, yellow-shafted flicker, red-shafted flicker, kingbird, European starling, evening grosbeak, pine grosbeak, purple finch, white-throated sparrow, song sparrow, cardinal, cedar waxwing, warbling vireo, red-eyed vireo, mocking bird, catbird, brown thrasher, hermit thrush, olive-backed thrush, gray-cheeked thrush, wood thrush, robin, eastern bluebird.
Tupelo, or sour gum.....	Nyssa.....	36	Yellow-shafted flicker, European starling, purple finch, cedar waxwing, gray-cheeked thrush, olive-backed thrush, robin.
Crowberry.....	Empetrum.....	16	Pine grosbeak, snowflake.
Bearberry.....	Arctostaphylos.....	16	Ruffed grouse, dusky grouse, valley quail, mountain quail, for sparrow, wren tit.
Huckleberry.....	Gaylussacia.....	35	Pine grosbeak, chewink, robin.
Blueberry.....	Vaccinium.....	67	Ruffed grouse, valley quail, kingbird, orchard oriole, pine grosbeak, chewink, cedar waxwing, catbird, brown thrasher, black-capped chickadee, tufted titmouse, hermit thrush, robin, eastern bluebird.
Beautyberry, or Mexican mulberry.	Callicarpa.....	10	Mocking bird, brown thrasher.
Partridgeberry.....	Mitchella.....	10	Ruffed grouse.
Elder.....	Sambucus.....	106	Valley quail, red-headed woodpecker, yellow-shafted flicker, eastern kingbird, Arkansas kingbird, black phoebe, European starling, California towhee, white-crowned sparrow, rose-breasted grosbeak, black-headed grosbeak, phainopepla, red-eyed vireo, mocking bird, catbird, brown thrasher, California thrasher, wren tit, olive-backed thrush, robin, western bluebird, eastern bluebird.
Snowberry.....	Symporicarpos.....	25	Sharp-tailed grouse, evening grosbeak, pine grosbeak, varied thrush.
Blackhaw.....	Viburnum.....	28	Ruffed grouse, yellow-billed cuckoo, yellow-shafted flicker, European starling, purple finch, rose-breasted grosbeak, cedar waxwing, catbird, brown thrasher, robin, eastern bluebird.
Honeysuckle.....	Lonicera.....	15	Bobwhite, pine grosbeak, white-throated sparrow, catbird, brown thrasher, hermit thrush, robin.

<sup>a</sup> Data given are based entirely on field observations; total number of birds eating the various species of *Elaeagnus* unknown.

#### MUNICIPAL PARKS AND PICNIC AND FAIR GROUNDS

Picnic grounds, fairgrounds, and parks may be improved as places of public gatherings, recreation, and education by increasing their bird population. Moreover, the alterations that improve a park as a bird haven may, and should, themselves be made to add

to its attractiveness. For instance, water is used to enhance the beauty of most parks, and a water supply is one of the most potent attractions for birds. (Fig. 3.) Bird baths or bird fountains may take the form of small displays of water, which may be added to many parks without being obtrusive or in conflict with the general design.

An artistic martin house, well placed in one of the small open lawns that most large parks contain (fig. 4), would not only increase the beauty and interest of the park, but would add to its dignity by suggesting a specific usefulness for the space. As for nest boxes



FIGURE 3.—Cedar waxwings attracted to bird fountain

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for other birds, they may be so inconspicuously placed that the chief evidence of their presence would be the increased number of birds and the lessened injury to vegetation by insect pests. The perfection of specimen trees in parks and the work of the tree surgeon on imperfect trees make it necessary to supply nest boxes if the hole-nesting birds are to have any chance of inhabiting parks.

Feeding stations for birds are made in a number of slightly designs, and the principles upon which they are built allow of their being extensively varied or incorporated into other park structures. The greatest usefulness of feeding stations in parks, aside from the preservation of birds, is in rendering such places more attractive to the public in winter. The feeding of birds is carried on with most obvious results during the colder months, and adding this feature to parks appeals strongly to thousands of lovers of nature.

By means of feeding stations it is possible to attract to convenient observation points several species of the most interesting and valuable birds. Such stations are particularly pleasing to children. As

evidence of the value of the method, the following statement of experience by the superintendent of parks, Minneapolis, Minn., is presented:

For the past five or six years we have maintained a number of feeding stations in various parts of our park system, with very satisfactory results. I give you a list of the birds which stay with us over winter. The permanent winter birds found in the vicinity of our parks are the chickadee, blue jay, white-breasted nuthatch, downy and hairy woodpeckers, and screech owl; winter visitors, the redpoll, tree sparrow, and junco; irregular winter visitors, the evening grosbeak, Bohemian waxwing, and snow bunting. It is safe to say that a large number of these species are staying in the parks on account of the food supplied them. The feeding of the wild birds in the parks is a great success and will be continued.

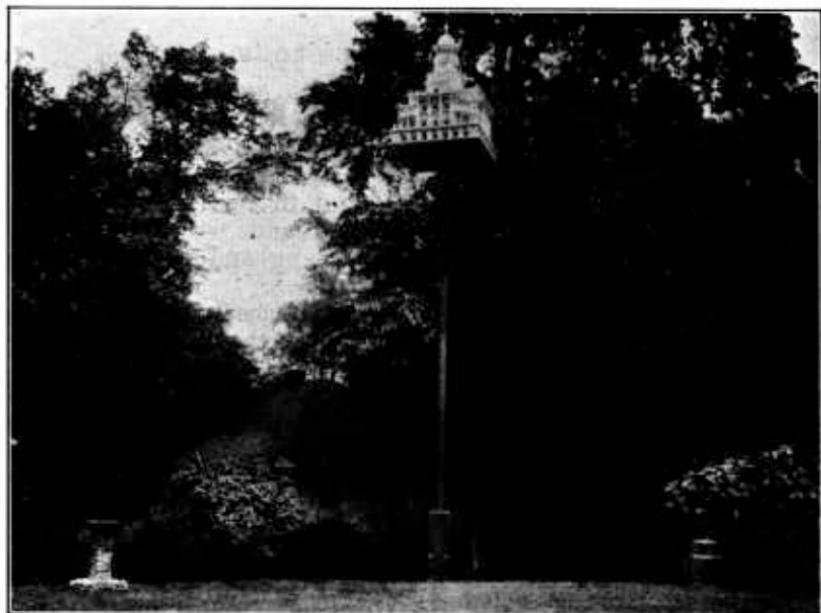


FIGURE 4.—Martin house and bird bath in parklike surroundings

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Supplying water, nest boxes, and winter food goes far toward making a bird haven, but it is important also to supplement the summer food. This can best be done by planting fruit-bearing shrubs and trees. Shrubs and trees are essential elements of park composition, but according to the judgment of bird lovers better choice is distinctly possible than that often made.

The guiding principle in park planning should be beauty, but it should not be a temporary or one-season beauty. Hence it follows that shrubs and trees that produce colored fruits and retain them for long periods are preferable to plants whose chief decorative contribution is a short burst of bloom. Such shrubs are handsomer at all times after flowering and are particularly valuable in winter when every bit of color in the landscape is precious. They are valuable, moreover, in supplying bird food. The kinds preferred by birds are shown in Table 1, and the species most suitable for various sections of the country are listed in the Farmers' Bulletins mentioned on page 1. (See also map, fig. 1.)

A few further suggestions as to the use of fruit-producing plants are not out of place. The ideal American park is natural woodland, modified and embellished, or a planting that follows natural lines. Informal treatment is almost universally preferred to formal. From the standpoint of bird attraction this is fortunate, since clipping shrubs either prevents or reduces the production of fruit and causes the plants to form such solid and dense surfaces that they are uninviting to birds. It may further be said in favor of untrimmed shrubbery that the normal form and beauty of the plants, together with the resultant play of light and motion, are preserved. With this treatment a park has naturalness and life; under formal treatment the suggestions are those of restraint and immobility.

#### SCHOOL AND COLLEGE GROUNDS

Too often public-school grounds are bare and uninviting. How much better it is to clothe, shade, and adorn them with green!<sup>3</sup> Flowers and trees will make the students more content with their surroundings, inspire them to better work, and enshrine the school grounds in pleasant memories delightful to recall in later years. Almost everything done to beautify the grounds will help to attract birds. Trees and shrubs cradle their young and supply much of their food.

The birds, the trees, and the flowers in themselves are a valuable educational resource, and are necessities for the proper conduct of classes in nature study, now deservedly so popular. Building and placing bird houses could well be part of such a course, and the winter feeding of the birds would attract living objects of interest during the dormant season of the trees and shrubs. All children like birds and will protect and encourage them if only their early steps are guided right.

The college campus, like the park, has suffered from formal landscape gardening. Wall-like hedges, closely cropped circles, triangles of shrubs, and mathematically designed edgings, beds, and gardens have gone far toward robbing school grounds of merit in the eyes of man, and have almost spoiled them for birds.

In campus planning it is desirable to take the birds into consideration for the same reasons as in park planning. In addition there is the important objective of keeping up an important educational resource. There is hardly an advanced school in the country that does not offer one or more courses of bird study. The study of birds out of doors is essential to a good bird course, and this need should be kept in view by those in charge of college and school grounds. Sylvan campuses where formerly birds abounded have been so filled with buildings, so gardened and formalized, that birds are now scarce. If possible, some corner (preferably of original woodland, where that exists) should be allowed to run wild. Judicious addition of food-producing plants should be made there, and the campus in general improved for birds by allowing shrubs to make natural growths. Putting up nest boxes would make up for the hole-eliminating activities of the tree surgeon. Winter feeding would be very interesting and instructive to many students and

<sup>3</sup> Farmers' Bulletin 1087, *Beautifying the Farmstead*, may be consulted to advantage in connection with improving school grounds.

could be carried on as part of the course of bird-study classes. Finally, the teacher of ornithology might well serve in an advisory capacity in relation to the planning and treatment of the campus.

#### CEMETERIES

Cemeteries have the reputation of being good places for birds. The reasons, one must infer, are seclusion, freedom from disturbance, and an abundance of trees and shrubs. The last-named factor is by no means least, nor, on the other hand, so satisfactory as not to be susceptible of improvement. Selection of shrubs and trees with the needs of birds in mind not only would not interfere with the general plan of a cemetery, but would make it a still better resort for birds.

Formal landscape gardening is more prevalent (perhaps excusably so) in cemeteries than in other public reservations, yet there are beautiful cemeteries in which formal composition plays little part. Here, as everywhere, the informal or naturalistic planting is most favorable to birds. Nest boxes can be added without being obtrusive, and bird fountains may be made to harmonize with the surroundings or even to serve as memorials.

#### RESERVOIRS

The grounds surrounding reservoirs of drinking water usually are well fenced and carefully guarded to minimize contamination. This results in freedom from disturbance, a boon so highly appreciated by birds that in itself it goes far toward making these places satisfactory bird havens. Such reservations can be greatly improved for this purpose, however, by the use of bird houses and by proper planting, measures that will be in no way deleterious to the water supply, but will greatly benefit the birds and through them the vegetation of the reserve and of the adjacent country.

Reservoirs other than for drinking water usually can be sown to aquatic plants, which will make them attractive to many water birds. The character of the planting will depend on circumstances; if a marshy margin is permissible, the place may be made into an excellent resort for wild fowl. If only submerged plants are desired and as clean a growth as possible, sago pondweed may be planted. Broader-leaved plants furnish much greater surface for the lodgment of silt and the growth of algae. The methods of propagating a variety of aquatic plants for the use of wild fowl are described in Department Bulletin 205, Eleven Important Wild-Duck Foods, and Department Bulletin 465, Propagation of Wild-Duck Foods.

#### GOLF COURSES

There are numerous public golf courses, and many of those established by clubs are so surrounded by residences of members as to become virtually community institutions. Golfers as a class are broadly interested in the out of doors, including its animal inhabitants, and most of them no doubt will be glad to cooperate in the preservation, encouragement, and increase of useful birds. In fact, considering the well-known utility of birds in destroying insect and other pests, golf clubs will only be consulting their own interests

in preserving and propagating these natural enemies of the foes of their greens and fairways.

Golf courses, without special modification, present several features that are attractive to birds. The broad expanses of short grass on the fairways furnish excellent feeding grounds for robins, meadow larks, European starlings, flickers, and killdeers. The longer grasses and weeds of the rough, and scattered clumps of trees and shrubbery open to full light, support an abundant insect population, an important source of food for our feathered friends. Many birds find nesting sites also in the arborescent growths present and sally forth for food over the grassed areas, where they are often joined by numbers of those aerial feeders, the swallows and swifts, which find on these unobstructed reaches happy hunting grounds.

Such are the impressions from observations made on a golf course well situated for birds. There are courses not so fortunate, but all have the fundamentals of valuable bird refuges. Protected to a considerable extent from trespass, and relatively free from the natural enemies of birds, golf courses already have much of the safety required for sanctuaries. Birds promptly respond to protection; but it should be as complete as possible. So far as food is concerned, insects are plentiful on most golf courses, but it would help the birds and ornament the courses if shrubbery on the grounds were selected chiefly from species producing fruits fed upon by birds. Most golf courses, again, have water hazards at which birds can drink and bathe; but where these are absent or are far apart, bird fountains could easily be attached to hydrant supply pipes. These not only would be a boon to birds on hot summer days, but if placed in view of rest benches would be a source of interest and entertainment to members and visitors.

Protection, food, water—these are the things that usually are present in some degree and that may very easily be supplemented; but nesting sites, especially for some of the most useful birds, are scarce or lacking on most golf courses. Trees and shrubbery (the latter best if in tangled masses) will accommodate many birds; but the birds that nest in cavities can hardly find a home on improved lands, especially where tree surgeons have been employed. Fortunately these birds will occupy artificial cavities or nest boxes.

In most cases nest boxes must be supplied if golf courses are to be enlivened and benefited by such beautiful and useful birds as the purple martin, the bluebird, the house wren, the tree swallow, the flicker, the white-breasted nuthatch, and the chickadee. At least twice as many other kinds of small birds have been known to occupy nest boxes. Placing nest boxes is work that can well be done in winter, a season during which, at least on northern courses, employees are but little occupied, and when members may welcome something to do out of doors. Names of dealers in bird boxes, bird baths, and the like, and bulletins treating all phases of bird attraction methods, as well as advice in special cases, may be obtained by application to the Bureau of Biological Survey, United States Department of Agriculture, Washington, D. C.